

What is claimed is:

1. A conduit for transferring a flowable material, comprising:

a wall member at least partially enclosing an inner region, the inner region being adapted to receive the flowable material and to facilitate transfer of the flowable material from a first location to a second location; and

a plurality of optical fibers being at least one of formed within an outer layer of the wall member and disposed on an outer surface of the wall member, the optical fibers being adapted to emit light outwardly therefrom.

2. The conduit of Claim 1, wherein the wall member includes a cylindrical wall member.

3. The conduit of Claim 1, wherein the wall member includes a flexible aerial refueling hose.

4. The conduit of Claim 1, wherein the wall member includes a refueling boom.

5. An apparatus for transferring a flowable material, comprising:

a tank adapted to contain a flowable material;

a conduit operatively coupled to the tank and adapted to receive the flowable material and to facilitate transfer of the flowable material between the tank and a second location, the conduit including a wall member; and

a plurality of optical fibers being at least one of formed within an outer layer of the wall member and disposed on an outer surface of the wall member, the optical fibers being adapted to emit light outwardly therefrom.

6. The apparatus of Claim 5, wherein the conduit includes a cylindrical wall member.

7. The apparatus of Claim 5, wherein the conduit includes a flexible aerial refueling hose.



25315

PATENT TRADEMARK OFFICE

8. The apparatus of Claim 5, wherein the conduit includes a refueling boom.

9. The apparatus of Claim 5, further comprising a pump operatively coupled to the
5 tank and to the conduit and adapted to pump the flowable material from the tank to the
conduit.

10. The apparatus of Claim 5, further comprising an illumination control system
operatively coupled to the plurality of optical fibers and adapted to control illumination of the
10 plurality of optical fibers.

11. An aircraft, comprising:

a fuselage;

a propulsion system operatively coupled to the fuselage; and

15 an aerial refueling system coupled to the fuselage and including:

a tank adapted to contain a flowable material;

a conduit operatively coupled to the tank and being adapted to receive
the flowable material and to facilitate transfer of the flowable material between the
tank and a second location, the conduit including a wall member; and

20 a plurality of optical fibers being at least one of formed within an outer
layer of the wall member and disposed on an outer surface of the wall member, the
optical fibers being adapted to emit light outwardly therefrom.

12. The aircraft of Claim 11, wherein the conduit includes a cylindrical wall member.

25

13. The aircraft of Claim 11, wherein the conduit includes a flexible aerial refueling
hose.

14. The aircraft of Claim 11, wherein the conduit includes a refueling boom.

30




25315

PATENT TRADEMARK OFFICE

- 11 -

BING-I-1020AP

BLACK LOWE & GRAHAM ^{PLLC}


816 Second Avenue
Seattle, Washington 98104
206.381.3300 • F: 206.381.3301

15. The aircraft of Claim 11, further comprising a pump operatively coupled to the tank and to the conduit and adapted to pump the flowable material from the tank to the conduit.

16. The aircraft of Claim 11, further comprising an illumination control system
5 operatively coupled to the plurality of optical fibers and adapted to control illumination of the plurality of optical fibers.

17. A method of transferring a flowable material, comprising:

10 providing a conduit operatively coupled to a tank containing the flowable material, the conduit being adapted to receive the flowable material and to facilitate transfer of the flowable material between the tank and a second location, the conduit including a wall member having a plurality of optical fibers being at least one of formed within an outer layer of the wall member and disposed on an outer surface of the wall member;

15 illuminating at least a portion of the optical fibers; and
transferring the flowable material through the conduit from the tank to the second location.

18. The method of Claim 17, wherein providing a conduit operatively coupled to a tank includes providing a conduit operatively coupled to a refueling tank of a tanker aircraft.

20

19. The method of Claim 17, wherein providing a conduit including a wall member having a plurality of optical fibers includes providing a conduit including a wall member having a plurality of optical fibers disposed longitudinally along the wall member.

25

20. The method of Claim 17, wherein providing a conduit including a wall member having a plurality of optical fibers includes providing a conduit including a wall member having a plurality of optical fibers circumferentially spaced along the wall member.



25315
PATENT TRADEMARK OFFICE

21. The method of Claim 17, wherein transferring the flowable material through the conduit from the tank to the second location includes pumping the flowable material from the tank.

22. A conduit for transferring a flowable material, comprising:

5 a wall member at least partially enclosing an inner region, the inner region being adapted to receive the flowable material and to facilitate transfer of the flowable material from a first location to a second location, the wall member including a luminescent outer layer being at least one of integrally formed with the wall member and disposed on an outer surface of the wall member, the luminescent outer layer being adapted to emit light
10 outwardly therefrom.

23. The conduit of Claim 22, wherein the luminescent outer layer includes an electroluminescent material.

15 24. The conduit of Claim 22, wherein the luminescent outer layer includes a phosphor substance.

25 25. The conduit of Claim 22, wherein the luminescent outer layer includes an ultraviolet-energized substance.
20

26. The conduit of Claim 22, wherein the wall member includes a cylindrical wall member.

27. The conduit of Claim 22, wherein the wall member includes a flexible aerial
25 refueling hose.

28. The conduit of Claim 22, wherein the wall member includes a refueling boom.



25315

PATENT TRADEMARK OFFICE

29. An apparatus for transferring a flowable material, comprising:

a tank adapted to contain a flowable material; and

a conduit operatively coupled to the tank and adapted to receive the flowable material and to facilitate transfer of the flowable material between the tank and a second location, the conduit including a wall member and being adapted to receive the flowable material and to facilitate transfer of the flowable material from a first location to a second location, the wall member including a luminescent outer layer being at least one of integrally formed with the wall member and disposed on an outer surface of the wall member, the luminescent outer layer being adapted to emit light outwardly therefrom.

10

30. The apparatus of Claim 29, wherein the luminescent outer layer includes an electroluminescent material.

31. The apparatus of Claim 29, wherein the luminescent outer layer includes a phosphor substance.

15

32. The apparatus of Claim 29, wherein the luminescent outer layer includes an ultraviolet-energized substance.

33. The apparatus of Claim 29, wherein the conduit includes a cylindrical wall member.

20

34. The apparatus of Claim 29, wherein the conduit includes a flexible aerial refueling hose.

35. The apparatus of Claim 29, wherein the conduit includes a refueling boom.

25

36. The apparatus of Claim 29, further comprising a pump operatively coupled to the tank and to the conduit and adapted to pump the flowable material from the tank to the conduit.

30



25315

PATENT TRADEMARK OFFICE

37. The apparatus of Claim 29, further comprising an illumination control system operatively coupled to the plurality of optical fibers and adapted to control illumination of the plurality of optical fibers.

5 38. An aircraft, comprising:

a fuselage;

a propulsion system operatively coupled to the fuselage; and

an aerial refueling system coupled to the fuselage and including:

a tank adapted to contain a flowable material; and

10 a conduit operatively coupled to the tank and adapted to receive the flowable material and to facilitate transfer of the flowable material between the tank and a second location, the conduit including a wall member and being adapted to receive the flowable material and to facilitate transfer of the flowable material from a first location to a second location, the wall member including a luminescent outer layer being at least one of integrally formed with the wall member and disposed on an
15 outer surface of the wall member, the luminescent outer layer being adapted to emit light outwardly therefrom.

39. The aircraft of Claim 38, wherein the luminescent outer layer includes an
20 electroluminescent material.

40. The aircraft of Claim 38, wherein the luminescent outer layer includes a phosphor substance.

25 41. The aircraft of Claim 38, wherein the luminescent outer layer includes an ultraviolet-energized substance.

42. The aircraft of Claim 38, wherein the conduit includes a cylindrical wall member.



25315

PATENT TRADEMARK OFFICE

- 15 -

BING-1-1020AP

BLACK LOWE & GRAHAM ^{PLLC}



816 Second Avenue
Seattle, Washington 98104
206.381.3300 • F: 206.381.3301

43. The aircraft of Claim 38, wherein the conduit includes a flexible aerial refueling hose.

44. The aircraft of Claim 38, wherein the conduit includes a refueling boom.

5

45. The aircraft of Claim 38, further comprising a pump operatively coupled to the tank and to the conduit and adapted to pump the flowable material from the tank to the conduit.

46. The aircraft of Claim 38, further comprising an illumination control system
10 operatively coupled to the plurality of optical fibers and adapted to control illumination of the plurality of optical fibers.

47. A method of transferring a flowable material, comprising:

15 providing a conduit operatively coupled to a tank containing the flowable material, the conduit being adapted to receive the flowable material and to facilitate transfer of the flowable material between the tank and a second location, the conduit including a wall member having a luminescent outer layer being at least one of formed within an outer layer of the wall member and disposed on an outer surface of the wall member;

illuminating the luminescent outer layer;

20 emitting light outwardly from the luminescent outer layer; and

transferring the flowable material through the conduit from the tank to the second location.

48. The method of Claim 47, wherein providing a conduit including a wall member
25 having a luminescent outer layer providing a conduit including a wall member having an outer layer including an electroluminescent material.

49. The method of Claim 47, wherein providing a conduit including a wall member
30 having a luminescent outer layer providing a conduit including a wall member having an outer layer including a phosphor substance.



25315

PATENT TRADEMARK OFFICE

- 16 -

BING-1-1020AP

BLACK LOWE & GRAHAM ^{PLLC}

816 Second Avenue
Seattle, Washington 98104
206.381.3300 • F: 206.381.3301

50. The method of Claim 47, wherein providing a conduit including a wall member having a luminescent outer layer providing a conduit including a wall member having an outer layer including an ultraviolet-energized material.

5

51. The method of Claim 47, wherein providing a conduit operatively coupled to a tank includes providing a conduit operatively coupled to a refueling tank of a tanker aircraft.

52. The method of Claim 47, wherein transferring the flowable material through the
10 conduit from the tank to the second location includes pumping the flowable material from the tank.

